

Remarks

Claims 1 to 7 are pending. Claims 2 and 5 are canceled. Claims 1 to 3 and 5 to 7 have been rejected. Claim 4 has been allowed. Claim 1 has been amended.

§ 103 Rejections

Claims 1-3 and 5-7 are rejected under 35 USC § 103(a) as being unpatentable over Chang et al. US Patent No. 5,774,340, hereafter, Chang, in view of Taniguchi, US Patent No. 5,084,124.

The Office Action states in part:

Regarding claim 1 and 5, Chang discloses a multi-layer double-sided wiring board comprising:

an insulating layer having an opening formed therein; a first conductive layer formed on an upper surface of the insulating layer (redistribution structure 12 with insulating layer 28, having input-output pads 34 and lines 36 on top surface 30, see figure 1, column 2, line 25-50);

a second conductive layer formed on a lower surface of the insulating layer and covering an inside wall of the opening and a portion of the first conductive layer which is exposed in the opening (conductive layer 48 along with plating layer 44/46/54, see figure 1, column 3, line 1-15);

the second conductive layer directly contacts the first conductive layer in the opening without the interface layer being interposed there between (plating layer 44 directly in contact with input/out pads 34, see figure 1);

the first and second conductive layers are materials having same conductivity (all the metal layers, including plating layer, made of copper, column 3, line 42-49), however,

fails to disclose an interface layer interposed between the insulating layer and at least a portion of one or both of the first and second conductive layers, wherein, the interface layer contains a material different from the materials of the first and second conductive layers.

Chang is silent about the connection of the first and second conductive material with the base material 28.

Taniguchi discloses a laminate, metal foil 4 bonded to the polyimide film 1 using adhesive 2 and 3, to have excellent bonding strength, figure 1, column 2, line 20-45.

A person of ordinary skill in the art at the time the invention was made would readily recognize the advantage of using adhesive layer, from the teachings of Taniguchi, in order to have better bonding strength.

Further, the adhesive layer can be used and applied to the base layer, on only one side or both the sides depending upon the specific manufacturing method used.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use the laminate of Chang, with the copper foil bonded to the base insulating material with an adhesive material, in order to have better bonding strength, to have better performance.

Additionally regarding claim 5, it is obvious to selectively remove the conductive and insulating material from the lower surface in order to have a via hole with desired structure.

Regarding claim 2, the modified structure of Chang further discloses the second conductive layer directly contacts the insulating layer at the inside wall of the opening without the interface layer being interposed there between, see Chang, figure 1.

Regarding claim 6 and 7, the modified circuit board of Chang further discloses the first and second conductive layers made of same material as claimed in claim 6 and of copper, as claimed in claim 7, Chang, column 3, line 43-49.

Applicants disagree with the basis for the Examiner's rejection of claims 1-3 and 5-7 and reserve the right to traverse the rejection in subsequent prosecution proceedings. However, Applicants have amended claim 1, making certain arguments irrelevant to the present prosecution.

Applicants have amended claim 1 to add the limitation that the interface layer is interposed between the insulating layer and the portion of the second conductive layer covering an inside wall of the opening.

According to MPEP 2142, to establish a case of *prima facie* obviousness, three basic criteria must be met: 1) there must be some suggestion or motivation, either in the references or generally known to one skilled in the art, to modify or combine reference teachings, 2) there must be reasonable expectation of success, and 3) the prior art references must teach or suggest all the claim limitations. The ability to modify the method of the references is not sufficient. The reference(s) must provide a motivation or reason for making the changes. *Ex parte Chicago Rawhide Manufacturing Co.*, 226 USPQ 438 (PTO Bd. App. 1984).

Applicants respectfully submit that the references cannot support a case of *prima facie* obviousness as to the amended claims because, among other possible reasons, the cited references do not provide a motivation or suggestion for using an adhesive material, as disclosed in Taniguchi, between the copper layer and dielectric layer in the vias of Chang. For one thing, Chang teaches depositing copper into the via openings in the dielectric layer by an electroplating process, which makes an adhesive unnecessary. Additionally, depositing an adhesive in the vias of Chang would require masking the surface, except for the via openings, then coating the adhesive in a manner that would produce a thin layer on the walls of the vias.

There could be no reasonable expectation of success in combining Chang and Taniguchi because it is not apparent that the solvent-coated adhesive of Taniguchi would produce a thin layer of adhesive on the via walls instead of pooling at the bottom of the via.

In addition, these references do not disclose all the elements of the present invention because they do not disclose an interface layer interposed between an insulating layer and a portion of a conductive layer covering an inside wall of an opening.

For these reasons, Applicant(s) submit that the cited references will not support a 103(a) rejection of the claims invention and request that the rejection be withdrawn.

The additional amendment to claim 1 was made only to clarify where the first and second conductive layers contact each other and is not a narrowing amendment.

Claim 3 is rejected under 35 USC § 103(a) as being unpatentable over the combination of Chang and Taniguchi, as applied to claims 1-2 and 6-7 above, and further in view of Yamanishi et al., US Patent No. 5,366,814, hereafter, Yamanishi.

The office action states in part:

Regarding claim 3, the modified circuit board of Chang further discloses all the features of the claimed invention except,

The interface layer contains at least one metallic element selected from the group consisting of nickel, cobalt, zinc, and chromium.

Yamanishi discloses varied treatment procedures on the copper foil, including treatment layer of Chromium, Nickel, Cobalt or Zinc on the surface foil to be bonded to the resin base, to impart heat resistance or other properties, column 4, line 11-35.

A person of ordinary skill in the art at the time the invention was made would readily recognize the advantage of using treatment layer of chromium, Nickel, Cobalt or Zinc, from the teachings of Yamanishi, in order to have better bonding strength, heat resistance and other properties, to the laminate. The treatment layer can be either applied to one of the conductive layer or both of the conductive layer, depending upon the specific requirements.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use the laminate of combination of Chang and Taniguchi, with the copper foil bonded to the base insulating material with a treatment layer of Chromium, Nickel, Cobalt or Zinc, in order to have better bonding strength, heat resistance and other desired properties, to have better performance.

Applicants incorporate by reference their response, above, to the rejection based on the combination of Chang and Taniguchi and further submit that the addition of Yamanashi does not make up for the deficiencies of Chang and Taniguchi as prior art references.

In addition to the foregoing arguments, Applicant(s) submit that a dependent claim should be considered allowable when its parent claim is allowed. *In re McCairn*, 1012 USPQ 411 (CCPA 1954). Accordingly, provided the independent claims are allowed, all claims depending therefrom should also be allowed.

Based on the foregoing, it is submitted that the application is in condition for allowance. Withdrawal of the rejections under 35 U.S.C. 103 is requested. Examination and reconsideration of the claims are requested. Allowance of the claims at an early date is solicited.

Respectfully submitted,

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Date

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